joint sealer.

After the traffic dividers are firmly set in the pavement, the lifting holes shall be filled to within ¾ in of the surface with dry sand and either sealed with joint mortar or joint sealer.

The Contractor shall keep the traffic dividers free of any material tending to deface or discolor them. Any dividers damaged shall be removed and replaced at the Contractor's expense.

611.4-METHOD OF MEASUREMENT:

The quantity of work done will be measured as the number of traffic dividers furnished and installed in place and accepted.

611.5-BASIS OF PAYMENT:

The quantity, determined as provided above, will be paid for at the contract unit price bid for this item, which price and payment shall constitute full compensation for furnishing, preparing, and installing the traffic dividers and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, materials, equipment, supplies, and incidentals necessary to complete the work.

611.6-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
611001-*	PRECAST CONCRETE TRAFFIC DIVIDERS	EACH

*Sequence number

SECTION 612
TUNNEL LINER PLATE PIPE

612.1-DESCRIPTION:

This work shall consist of tunneling, lining and field paving for tunnel liner plate pipe, galvanized and asphalt coated, in accordance with these specifications and in reasonably close conformity with the lines, grades, dimensions and locations shown on the Plan or established by the Engineer.

612.2-MATERIALS:

612.2.1-Liner Plates: Tunnel liner plate pipe shall have the neutral axis diameter specified on the Plans, shall be hot dipped galvanized and shall be double dipped in asphalt cement. The plates shall be of the thickness specified, punched for bolting on both longitudinal and circumferential seams, and shall be so corrugated that they have a moment of inertia of not less than that specified on the Plans. Moment of inertia shall be expressed in inches (mm) to the fourth power per inch (mm) of plate based upon the average for one ring of plates. A minimum of 10 percent of the plates shall be provided with grout

plugs for grouting the space between the excavation and the plates. Base material for tunnel liner plates shall conform to the requirements of ASTM A 569. Galvanizing of the plates shall conform to the requirements of AASHTO M 167. Plate design shall be such that complete erection of plates can be accomplished from the inside of the tunnel.

Plates shall be fabricated in accordance with the applicable detail drawings on pages 298, 300, and 301 of "Handbook of Steel Drainage and Highway Construction Products", Latest Edition, published by American Iron and Steel Institute.

612.2.2-Hardware: Bolts and nuts used with lapped seams shall be not less than ⅝ inch (16 mm) in diameter. The bolts shall conform to the specifications of ASTM A 449 for plate thickness equal to or greater than 0.209 inches (5.3 mm) and ASTM A 307 for plate thickness less than 0.209 inches (5.3 mm). The nuts shall conform to ASTM A 563, grade a for A307 bolts and A563 DH for A449 bolts.

Bolts and nuts used with four flanged plates shall be not less than ½ inch (12 mm) in diameter for plate thicknesses up to and including 0.179 inches (4.5 mm) and not less than ⅝ inch (16 mm) in diameter for plates of greater thickness. The bolts and nuts shall be quick acting coarse thread and shall conform to ASTM A 307, Grade A.

Hardware shall be galvanized or cadmium plated in accordance with ASTM A 153, or ASTM B 766, CI.25 respectively.

612.2.3-Bituminous Coating: Bituminous coating shall conform to the applicable requirements of 713.3, The plates shall be fully coated.

612.2.4-Paving: Field paving shall be of Class B Concrete, conforming to the applicable requirements of 601.3.

612.2.5-Grout: Grout shall consist of portland cement and sand conforming to the requirements of 218.2 and 218.3.3, except that proportions of cement and sand may be modified to suit conditions encountered in the field.

CONSTRUCTION METHODS

612.3-GENERAL:

The Contractor shall furnish shop drawings showing a typical section of the tunnel, details of the plates, seams, size and length of bolts, and the moment of inertia of the plates in inches (mm) to the fourth power per inch (mm) of width for the ring of plates.

At all times during the construction period the work shall be under the supervision of a superintendent with a proven record of tunneling and the use of tunnel liner plates.

612.4-TUNNELING AND LINING:

612.5

Work may begin at either the outlet or inlet end. If necessary to reach the entrance grade, a shaft of minimum 8 feet (2.5 m) width and 12 feet (3.7 m) length shall be dug and the shaft sheeted and shored if necessary. Tunnel mucking shall be carried out not greater than 24 in. (600 mm) ahead of the bolting up of plates. Disposal of the removed spoil shall be in accordance with the directions of the Engineer. Mucking shall be done smoothly to fit the outside of the liner plates. The Contractor shall be responsible for adherence the line and grade, and deviations from line and grade more than 3 inches (75 mm) shall require the approval of the Engineer. If necessary, due to the type of soil encountered, jacking type shield shall be used.

At the end of each working day, the Contractor shall construct a bulkhead inside the pipe at the construction face.

612.5-GROUTING:

Grout blocks shall be installed at each end after bolting up is completed. Grouting shall start at one end and shall be carried forward until the area between the excavation and the plates is completely filled with grout. Grouting should be performed on a daily basis and progressed simultaneously with the installation of the tunnel liner plate.

612.6-FIELD PAVING:

Field paving, using portland cement concrete, shall be accomplished in accordance with the applicable requirements of 604.9.

612.7-METHOD OF MEASUREMENT:

The quantity of work done will be measured in linear feet (meters) of Tunnel Liner Plate Pipe, complete in place and accepted.

612.8-BASIS OF PAYMENT:

The quantity, determined as provided above, will be paid for at the contract unit price bid per linear foot (meter), which price and payment will be full compensation for furnishing all the materials and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies and incidentals necessary to complete the work.

612.9-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
612001-*	"size" TUNNEL LINER PLATE PIPE, 2-FLANGE DESIGN	LINEAR FOOT (METER)
612002-*	"size" TUNNEL LINER PLATE PIPE, 4-FLANGE DESIGN, TYPE "type", Y	LINEAR FOOT (METER)

* Sequence number

Y = a letter designating base metal (zinc-coated) thickness in accordance with the following table:

Y	MILS (mm)
B	79 (2.0 mm)
C	109 (2.7 mm)
D	138 (3.5 mm)
E	168 (4.3 mm)
F	188 (4.8 mm)
G	218 (5.5 mm)
H	249 (6.3 mm)
J	280 (7.1 mm)

613-BLANK

SECTION 614
PILING WALLS

614.1 - DESCRIPTION:

This work shall consist of furnishing and placing steel piles in predrilled holes, concrete or grout, backfill and lagging, of the kinds and dimensions designated, in accordance with these provisions and in reasonably close conformity with the lines, grades, dimensions, and locations shown on the Plans or established by the Engineer. Painting of the exposed steel is included.

Careful attention shall be given to assuring the pile wall will tie directly into an existing stable slope. Prior to ordering any materials, the contractor in conjunction with the Engineer shall conduct a project site review in order to verify the limits of the pile wall.

614.2 - MATERIALS:

Materials shall conform to the requirements specified in the following Subsections of Division 700:

MATERIAL	SUBSECTION
Steel Piles and Splices	709.12
Steel Lagging and Wales	709.12
Reinforcing Steel	709.1
Prestressing Steel	709.2
Treated Timber Lagging	710
Portland Cement	701.1
Fine Aggregate	702.1
Fly Ash	707.4

614.3 - DRILLING: